

# POLYTHIOPHENES, BLOCK COPOLYMERS MADE THEREFROM, AND METHODS OF FORMING THE SAME

## ABSTRACT

The present invention relates to polythiophenes, particularly regioregular head-to-tail poly(3-alkylthiophenes) (HT-PATs), block copolymers made therefrom, and their methods of formation. The present invention provides HT-PATs with well-defined, specific end-groups, functionalization of the defined HT-PATs, and incorporation of end group functionalized HT-PATs into block copolymers with structural polymers. The intrinsically conductive diblock and triblock copolymers, formed from the HT-PATs, have excellent conductivity and low polydispersities that are useful in a number of applications. The block copolymers of the present invention have been found to exhibit conductivities that range from a low of  $10^{-8}$  S/cm for certain applications to as high as several hundred S/cm or more.